



**[4910-13]**

**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part 25**

**[Docket No. FAA-2013-0897; Notice No. 25-13-29-SC]**

**Special Conditions: Airbus, Model A350-900 Series Airplane; Transient Engine Failure Loads**

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Notice of proposed special conditions.

**SUMMARY:** This action proposes special conditions for Airbus Model A350-900 series airplanes. These airplanes will have a novel or unusual design feature associated with the new generation of high bypass engines and the potential loads resulting from extreme engine failure conditions.

The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. These proposed special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

**DATES:** Send your comments on or before **[insert a date 45 days after date of publication in the Federal Register]**.

**ADDRESSES:** Send comments identified by docket number FAA-2013-0897 using any of the following methods:

- Federal eRegulations Portal: Go to <http://www.regulations.gov/> and follow the online instructions for sending your comments electronically.
- Mail: Send comments to Docket Operations, M-30, U.S. Department of Transportation (DOT), 1200 New Jersey Avenue, SE, Room W12-140, West Building Ground Floor, Washington, D.C., 20590-0001.
- Hand Delivery or Courier: Take comments to Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE, Washington, D.C., between 9 a.m. and 5 p.m., Monday through Friday, except federal holidays.
- Fax: Fax comments to Docket Operations at 202-493-2251.

Privacy: The FAA will post all comments it receives, without change, to <http://www.regulations.gov/>, including any personal information the commenter provides. Using the search function of the docket web site, anyone can find and read the electronic form of all comments received into any FAA docket, including the name of the individual sending the comment (or signing the comment for an association, business, labor union, etc.). DOT's complete Privacy Act Statement can be found in the Federal Register published on April 11, 2000 (65 FR 19477-19478), as well as at <http://DocketsInfo.dot.gov/>.

Docket: Background documents or comments received may be read at <http://www.regulations.gov/> at any time. Follow the online instructions for accessing the docket or go to the Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE, Washington, D.C., between 9 a.m. and 5 p.m., Monday through Friday, except federal holidays.

**FOR FURTHER INFORMATION CONTACT:** Todd Martin, FAA, International Branch, ANM-115, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW., Renton, Washington, 98057-3356; telephone (425) 227-1178; facsimile (425) 227-1320.

## **SUPPLEMENTARY INFORMATION:**

### **Comments Invited**

We invite interested people to take part in this rulemaking by sending written comments, data, or views. The most helpful comments reference a specific portion of the proposed special conditions, explain the reason for any recommended change, and include supporting data.

We will consider all comments we receive on or before the closing date for comments.

We may change these special conditions based on the comments we receive.

### **Background**

On August 25, 2008, Airbus applied for a type certificate for their new Model A350-900 series airplane. Later, Airbus requested and the FAA approved an extension to the application for FAA type certification to June 28, 2009. The Model A350-900 series has a conventional layout with twin wing-mounted Rolls-Royce Trent engines. It features a twin aisle 9-abreast economy class layout, and accommodates side-by-side placement of LD-3 containers in the cargo compartment. The basic Model A350-900 series configuration will accommodate 315 passengers in a standard two-class arrangement. The design cruise speed is Mach 0.85 with a Maximum Take-Off Weight of 602,000 lbs. Airbus proposes the Model A350-900 series to be certified for extended operations (ETOPS) beyond 180 minutes at entry into service for up to a 420-minute maximum diversion time.

The existing regulations are inadequate because the new, large bypass fan engines of the Model A350-900 series airplanes can cause more damage in a failure event than the previous engines. To maintain the level of safety envisioned by Title 14, Code of Federal Regulations (14 CFR) 25.61(b), more comprehensive criteria are needed for the new generation of high bypass engines. The more severe events resulting from extreme engine failure conditions would be treated as dynamic load conditions. The proposed special conditions would distinguish between the more common engine failure events and those rare events resulting from structural failures. The more common events would continue to be treated as static torque limit load conditions. The severe events would be considered ultimate loads, and include all transient loads associated with the event. An additional safety factor would be applied to the more critical airframe supporting structure.

### **Type Certification Basis**

Under Title 14, Code of Federal Regulations (14 CFR) 21.17, Airbus must show that the Model A350-900 series meets the applicable provisions of 14 CFR part 25, as amended by Amendments 25-1 through 25-128.

If the Administrator finds that the applicable airworthiness regulations (i.e., 14 CFR part 25) do not contain adequate or appropriate safety standards for the Model A350-900 series airplane because of a novel or unusual design feature, special conditions are prescribed under § 21.16.

Special conditions are initially applicable to the model for which they are issued. Should the type certificate for that model be amended later to include any other model that incorporates

the same or similar novel or unusual design feature, the proposed special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and proposed special conditions, the Model A350-900 series must comply with the fuel vent and exhaust emission requirements of 14 CFR part 34 and the noise certification requirements of 14 CFR part 36 and the FAA must issue a finding of regulatory adequacy under section 611 of Public Law 92-574, the "Noise Control Act of 1972."

The FAA issues special conditions, as defined in 14 CFR 11.19, under § 11.38, and they become part of the type-certification basis under § 21.17(a)(2).

### **Novel or Unusual Design Features**

The Model A350-900 series airplane will incorporate the following novel or unusual design features: engines with large, bypass fans capable of producing much higher failure loads than previous engines. The Model A350-900 will therefore require additional dynamic loads analyses to assess the most severe engine failure events. The loads resulting from these conditions would be considered as ultimate loads, with an additional safety factor applied to the airframe supporting structure.

### **Discussion**

The size, configuration, and failure modes of jet engines has changed considerably from those envisioned by Title 14 Code of Federal Regulations (14 CFR) 25.361(b) when the engine seizure requirement was first adopted. Engines have become larger and are now designed with large bypass fans capable of producing much higher failure loads. Relative to the engine configurations that existed when the rule was developed in 1957, the present generation of

engines are sufficiently different and novel to justify special conditions for Model A350-900 series airplanes. Service history has shown that the engine failure events that tend to cause the most severe loads are fan blade failures and these events occur much less frequently than the typical “limit” load condition.

The regulatory authorities and industry developed a standardized requirement in the Aviation Rulemaking Advisory Committee (ARAC) forum. The technical aspects of this requirement have been agreed and have been accepted by the ARAC Loads and Dynamics Harmonization Working Group. The proposed special condition reflects the ARAC recommendation and is essentially harmonized with the corresponding EASA Certification Specifications (CS) 25. In addition, the ARAC recommendation includes corresponding advisory material that is incorporated in CS-25. This advisory material is considered an acceptable means of compliance to the proposed special conditions.

### **Applicability**

As discussed above, these proposed special conditions apply to the Airbus Model A350-900 series airplanes. Should Airbus apply later for a change to the type certificate to include another model incorporating the same novel or unusual design feature, the proposed special conditions would apply to that model as well.

### **Conclusion**

This action affects only certain novel or unusual design features on the Model A350-900 series airplanes. It is not a rule of general applicability.

### **List of Subjects in 14 CFR Part 25**

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for these proposed special conditions is as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

### **The Proposed Special Conditions**

Accordingly, the Federal Aviation Administration (FAA) proposes the following special conditions as part of the type certification basis for Airbus Model A350-900 series airplanes.

In lieu of § 25.361(b) the following special condition is proposed:

1. For turbine engine installations, the engine mounts, pylons, and adjacent supporting airframe structure must be designed to withstand 1g level flight loads acting simultaneously with the maximum limit torque loads imposed by each of the following:
  - a. sudden engine deceleration due to a malfunction that could result in a temporary loss of power or thrust,
  - b. the maximum acceleration of the engine.
2. For auxiliary power unit installations, the power unit mounts and adjacent supporting airframe structure must be designed to withstand 1g level flight loads acting simultaneously with the maximum limit torque loads imposed by each of the following:
  - a. sudden auxiliary power unit deceleration due to malfunction or structural failure; and
  - b. the maximum acceleration of the power unit.
3. For engine supporting structure, an ultimate loading condition must be considered that combines 1g flight loads with the transient dynamic loads resulting from:
  - a. the loss of any fan, compressor, or turbine blade; and separately
  - b. where applicable to a specific engine design, any other engine structural failure that results in higher loads.

4. The ultimate loads developed from the conditions specified in paragraphs 3.a. and 3.b. are to be multiplied by a factor of 1.0 when applied to engine mounts and pylons and multiplied by a factor of 1.25 when applied to adjacent supporting airframe structure.
5. The airplane must be capable of continued safe flight considering the aerodynamic effects on controllability due to any permanent deformation that results from the conditions specified in 3.

Issued in Renton, Washington, on October 22, 2013.

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